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ABSTRACT

This study compared the achievement scores for students receiving traditional spelling instruction to achievement scores earned with computer aided instruction. Similarly, attitude measures were compared for the same subjects. Fourth- and fifth-grade pupils received traditional spelling instruction for five weeks. For the next five weeks, students received their spelling instruction via a computer program. Testing was conducted in a traditional end-of-the-week spelling test for the entire experiment. Students' attitudes were measured using a semantic differential at the beginning and end of the computer aided segment of the study. Student achievement improved with computer aided instruction while the attitudes typically did not. (Author)

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The Effects of Computer Aided Spelling Instruction and Traditional Spelling Instruction on Achievement and Attitude

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by

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Abstract

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This study compared the achievement scores of students receiving traditional spelling instruction to achievement scores earned with computer aided instruction. Similarly, attitude measures were compared for the same subjects. Fourth and fifth grade pupils received traditional spelling instruction for five weeks. For the next five weeks, students received their spelling instruction via a computer program. Testing was conducted in a traditional end-of-the-week spelling test for the entire experiment. Students' attitudes were measured using a semantic differential at the beginning and end of the computer aided segment of the study. Student achievement improved with the computer aided instruction while the attitudes typically did not.

KEY WORDS: Achievement, instruction, spelling, computer instruction, traditional instruction, attitude

BACKGROUND AND PURPOSE OF THE STUDY

In recent years the use of microcomputers in education has grown rapidly. Many assertions as to the benefit of computers have been made. This study is an effort to examine only one of the assertions, i.e., that computers can help improve spelling scores of elementary age pupils. The idea being nurtured by this study is that if pupils can learn to spell the required words without help from the teacher, then the teacher can use the group activity time to teach other subjects and therefore enhance the scope of the child's learning.

The main purpose of this study was to investigate if students receiving computer aided instruction would receive higher scores on their weekly spelling tests than when receiving traditional spelling instruction.

A REVIEW OF THE LITERATURE

A review of the literature was conducted for the purpose of constructing an educationally-sound instructional program for the teaching of spelling. Little research was found concerning the efforts of computers and computer aided instruction on student achievement. There were however articles which reviewed spelling programs and made suggestions for

improving instruction. Balajthy (1985) commented on spelling programs by pointing out they had limited use and that the teacher still played an important role in the language arts aspect of teaching spelling. He also stated that a computer spelling program should be written so a teacher could program the computer with the spelling words from their regular instructional spelling program.

Other works such as Moxley and Barry (1985) discussed the value of using microcomputers and existing software such as LOGO to teach very young children developmental spelling. The article dealt primarily with the advantages of developmental spelling and offered very little empirical data.

Many of the formal studies were of the 1968-1973 vintage. This was a time in which much thought and serious research was going on in all aspects of computer aided instruction. It was also a time in which all of the work was being done in large computers with the children working at terminals because micro-computers were not available. Robertson (1978), while studying spelling in meaningful and non-meaningful content reported computer aided instruction significantly helped poor spellers in the third grade.

Block (1974) stated that learning rates were influenced by the way correct spelling was displayed. Block also pointed out that audio had little effect on spelling achievement. This lack of an audio effect, while interesting, has not been pursued formally by spelling researchers. In a two group comparison study, Riesdesel and Demshock (1968) reported no significant differences between the group using computer aided instruction and the traditional spelling methods. However, Dunwell (1972) reported that in an experimental spelling study the computer aided instruction group significantly out performed the traditional group. Dunwell's study emphasized spelling patterns and word usage. All these students used hardware which was quite different from the hardware utilized by the microcomputer.

Research in the area of good instructional software is limited also. Balajthy (1984) identified several characteristics of good reinforcement and drill computer software. These characteristics, such as different type exercises, cloze procedures, and self-paced activities were all important to good instructional software.

While there is little research on computer aided instruction to teach spelling, the teaching of spelling

by traditional methods has been well researched. Allred (1977) summarized the research on spelling and outlined a proven method of teaching spelling. In general, the research suggested that:

1. The learner needs to be actively involved.

2. Spelling instruction should be individualized and self paced.

3. Activities should be highly motivated rather than lengthy.

4. Activities should include visual practice.

A criticism of many of the commercially available spelling programs is they do not attend to the known good practices in the teaching of spelling. The computer programs used in this study were designed with research findings in mind. For example, the program provided hints, visual reinforcements, in-context practice, immediate feedback, self tests, and intense involvement.

HYPOTHESES

The purpose of this study was to measure whether the students scored higher on weekly tests of spelling achievement when receiving spelling instruction via computer than when receiving instruction in a traditional manner. Based upon this purpose the following hypotheses were formulated:

Hypothesis 1

There will be no significant difference at the .01 level between the scores of students receiving computer aided instruction and the scores of students receiving traditional instruction on a measure of spelling achievement.

Hypothesis 2

There will be no significant difference at the .01 level between students receiving computer aided instruction and students receiving traditional instruction on a measure of attitude toward spelling.

DEFINITION OF TERMS

For the purpose of this study the following terms were defined:

1. Computer Aided Spelling Instruction
   Computer aided instruction is instruction delivered by a computer program. The child runs the computer program which provides all of the spelling instruction for the unit.
2. Traditional Spelling Instruction
   Traditional spelling instruction is a five day spelling plan as outlined by Burns and Broman (1981, pp 300-305) in which the students practice spelling the words, do exercises that give meaning and imagery to the

words, use written expressions and partner drill practice.

3. Spelling Achievement

   Spelling achievement is the students' scores on their weekly spelling tests. A student's average on the weekly spelling scores is the achievement score for the five week period.

4. Attitude

   Attitude is represented by the student's score on the semantic differential. The score is the average of the student's score on each of the evaluation scales.

DESIGN OF THE STUDY

The sample in this study was 114 fourth and fifth grade students from an urban-type, lower-income neighborhood school. There were four classrooms involved with all students in each classroom participating in the study. The classroom organization at this particular school was a form of open education where the teachers practice team teaching. Instructional techniques were based on Jack Frymier's model which calls for grouping by a set of instructional objectives. Consequently, each student participating in the study worked on a unique set of spelling words

directly related to the student's individual needs. As a result, there were as many as twelve different spelling units in progress at one time.

Students were scheduled to work on the computer a minimum of ten minutes each day. Teachers were instructed to allow extra practice if time permitted. A research assistant monitored the weekly schedules to make sure each student had practiced the assigned amount of time, took the weekly tests, and was administered any test missed.

The study took place over two five-week periods. During the first five weeks, the students received traditional spelling instruction. During the second five weeks, the students received computer aided spelling instruction. The teachers were given training in the use of the computer spelling program prior to use in the classroom. In this phase of the study the only participation of the teachers was to pronounce the spelling words for the children on Monday and give the weekly spelling test on Friday.

The attitude scores were pre-test and post-test scores on a semantic differential instrument (see appendix) which was based on the attitude toward math

(McCalum and Brown, 1971; Grady, 1973) and on the work of Osgood (1957). The teachers were trained by the researchers in the administration of the test. The teachers used transparencies and a script prepared by the researchers to insure a reliable and consistent test setting. The instrument lacked face validity which was intended to make it difficult for the student to provide unreliable data. The test was administered at the beginning of the study and at the end of the study.

DESCRIPTION OF COMPUTER PROGRAMS

The criteria for the computer spelling program used in this study was based on instructional sound principles derived from a review of the literature. The program provided a wide variety of spelling activities with each activity focusing on the research principles. Feedback to the student was immediate and helpful hints were strategically placed in the program.

The main spelling program was menu-driven which offered the student the following options:

1. Practice the words.
2. Use one-half the words in a sentence.
3. Use last one-half of words in a sentence.
4. Take a practice test.

When selecting Option 1, a word from the student's spelling list would appear on the computer screen, remain approximately 30 seconds, and then the student was directed to type the word. If spelled correctly, the student was informed by the computer program and the next word from the spelling list would appear. If the word was spelled incorrectly, the student was advised "The word is incorrect" and the correct spelling would appear again on the screen. Following this, hints on the correct spelling of the word were given by providing a corresponding number of underlined spaces for each letter in the spelling word and the student was directed to type the word. If spelled incorrectly, the word was displayed and remained on the screen until typed by the student. After the last word in the spelling list, the words which were missed on the first try were displayed on the screen to be written on paper for further study. The main menu would then reappear. These procedures were designed to reduce the frustration level of the child, guarantee a certain measure of success, give immediate feedback, and provide additional practice.

Options 2 and 3 were similar. The format of the program was fill-in-the-blank. A sentence was displayed with a spelling word missing. Under the

sentence, three words from the spelling list were displayed in a multiple choice format. The child was directed to type the word thought to be correct. No second chance was given. If correct, the computer program stated "You are correct." If not, the program said "Incorrect" and pointed out the correct word. In either case, the sentence was re-displayed with the correct word in the proper place. These two options provided a very different type of practice than did the practice choice. In Options 2 and 3, the student saw the word in context and also practiced typing it.

Option 4 was a straight practice test. Feedback was provided as to correct or incorrect, but no retries were possible. The student's score was displayed at the end of the test. The four choices could be done in any order and as many times as the teacher felt the student needed the practice. None of the options took a long period of time to accomplish, which allowed many students a chance to work through the program in a short time frame.

There were two other programs to support the main program. The first provided a simple way for the teacher to enter the spelling words for a particular unit. The words were stored on disk under the unit number. The second program provided the teacher

uncomplicated means to enter sentences, the three word choices of distractors, and the correct answer. These two programs made it possible for the teacher to manage the lists and sentences without being a computer specialist. When writing the program, consideration was given as to how long a word would appear and to the position of the word on the screen. Additional attention was given to the software design criteria of consistency and simplicity. The screen was uncluttered and instructions were unambiguous. Keyboard errors and disk errors were trapped and dealt with internally.

RESULTS OF THE STUDY

Hypothesis 1 was tested using a t-test for related samples. The scores of each group were compared on a pre-test vs post-test basis. The results are displayed in Table 1. All four test statistics were significant at the .01 level. The scores were statistically higher after the computerized instruction than after the traditional instruction.

Insert Table 1 about here

The attitude scores were compared for each class.

The results are displayed in Table 2. The results were statistically non-significant and when examined subjectively, appeared random in direction. It should be noted that 4.0 is a neutral score and 7.0 is a perfect high attitude score. The students in this study consistently showed positive attitudes toward spelling. With standard deviations near .5, it would take a phenomenal improvement in attitude to reach statistically significant results.

Insert Table 2 about here

INTERPRETATION OF THE RESULTS

The results of this study clearly indicated that the computer aided spelling instruction was successful and could be achieved in a relatively short time. Spelling can clearly be taught independent of teacher directed instruction. If the instruction is pedogogically sound, the student will be successful. Furthermore teachers are freed to spend the time helping students in other areas and can offer other types of language arts instruction.

There were other learning by-products of this

study. For example, the students worked independently, gained computer literacy, became more proficient at using the keyboard, and were highly motivated to study spelling using the computer. The spelling program also provided additional reading practice when the student was working on the sentence activities.

The attitude scores were not significant. Yet, two groups had an increase in values and two had a decrease in values. Perhaps the attitudes were affected more by the teacher's classroom atmosphere than by the computer activities. Attitude studies traditionally have indicated that student achievement attitudes change slowly over time.

The results of this study have encouraged the researchers to replicate the study with different populations and instructional levels. Ultimately, the goal is for the computer aided spelling program to be used as a model for teaching spelling.

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Appendix

Attitude Semantic Differential

Spelling

HARD	___.___.___.___.___.___.___	SOFT
SLOW	___.___.___.___.___.___.___	FAST
NICE	___.___.___.___.___.___.___	MEAN
MOVING	___.___.___.___.___.___.___	STOPPED
UGLY	___.___.___.___.___.___.___	PRETTY
IMPORTANT	___.___.___.___.___.___.___	NOT IMPORTANT
GOOD	___.___.___.___.___.___.___	BAD
DIFFICULT	___.___.___.___.___.___.___	EASY

Table 1

Spelling Achievement t-tests

Class	N	Mean pre-test	Mean post-test	T
A	33	72.1	85.2	7.58*
B	28	68.5	79.2	7.37*
C	27	82.1	89.3	4.75*
D	26	70.9	81.6	7.71*

* sig @ .01 level

Table 2

Spelling Attitude t-tests

Class	N	Mean pre-test	Mean post-test	T
A	33	5.1	5.2	.21
B	28	4.2	3.7	-.97
C	27	4.9	4.7	-.36
D	26	4.6	5.2	1.04